APPENDIX 2. SAMPLE AIRPLANE FLIGHT MANUAL SUPPLEMENT .

INSTALLATION CENTER/FAA REPAIR STATION #_____
123 Fourth Street Anytown, USA

FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENT
LORAN-C NAVIGATION SYSTEM

AIRPLANE MAKE:

AIRPLANE MODEL:

AIRPLANE SERIAL NUMBER:

AIRPLANE REGISTRATION NUMBER:

This document must be carried in the airplane at all times. It describes the operating procedures for the _____ Loran-C System when it has been installed in accordance with (manufacturer's installation manual) and FAA Form 337 dated _____.

For airplanes with a Pilot's Operating Handbook and/or FAA approved Airplane Flight Manual, this document serves as the FAA Approved _____ Loran-C Flight Manual Supplement. When the Loran-C system is installed in an airplane that does not have an FAA approved Airplane Flight Manual, this document serves as the FAA Approved Supplemental Flight Manual.

The information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual (if applicable).

FAA APPROVED: _____
(Inspector's Name)
Aviation Safety Inspector (Avionics)
ACE-GADO/ACDO/FSDO #_____
Federal Aviation Administration

FAA APPROVED
DATE:_____

INSTALLATION CENTER/FAA REPAIR STATION #_____
123 Fourth Street
Anytown, USA

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LORAN-C NAVIGATION SYSTEM

SECTION I

INTRODUCTION

A. EQUIPMENT DESCRIPTION

Provide a general description of the Loran-C Area Navigation System installed in the aircraft.

B. GENERAL

Provided the _____ Loran-C navigation system is receiving adequate usable signals it has been demonstrated capable of and has been shown to meet the accuracy specifications of:

1. VFR/IFR en route, terminal and approach (if applicable) operation within the conterminous United States and Alaska in accordance with the criteria of AC 20-121A.

2. Flight in the North Atlantic (NAT) Minimum Navigation Performance Specifications (MNPS) airspace in accordance with AC 91-49, General Procedures for Flight in North Atlantic Minimum Navigation Performance Specifications Airspace (if applicable).

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LORAN-C NAVIGATION SYSTEM

SECTION II

LIMITATIONS

A. The _____ Loran-C Pilot's Guide, P/N _____, dated _____, or later revision) must be immediately available to the flightcrew whenever navigation is predicated on the use of the system.

B. Navigation using the _____ Loran-C system is limited to the following area(s).

(Define approved operating areas)

C. IFR navigation is prohibited unless the pilot verifies each selected waypoint for accuracy by reference to current approved data.

(If the equipment incorporates a navigation data base or stored flight plan data, the pilot must verify the currency of this data prior to use.)

D. When using the Loran-C, additional equipment required for the specific type of operation must be installed and operable.

E. The Loran-C system position must be checked for accuracy (reasonableness) prior to use as a means of navigation and under the following conditions:

1. Prior to each compulsory reporting point during IFR operation when not under radar surveillance or control.

2. Prior to requesting off-airway routing, and at hourly intervals thereafter during RNAV operation off approved RNAV routes.

3. At or prior to arrival at each en route waypoint during RNAV operation along approved RNAV routes.

4. Upon acquisition of a new GRI.

F. During periods of dead reckoning operation, the _____ Loran-C should be used with care.

FAA APPROVED
DATE: _____

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123 Fourth Street
Anytown, USA

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LORAN-C NAVIGATION SYSTEM

SECTION III

EMERGENCY PROCEDURES

A. If sensor information is intermittent or lost, utilize remaining operational navigation equipment as required.

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Anytown, USA

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LORAN-C NAVIGATION SYSTEM

SECTION IV

NORMAL PROCEDURES

A. OPERATION

Normal operating procedures are outlined in the Pilot's Guide, P/N _____, dated _____, (or later revision).

B. SYSTEM ANNUNCIATORS

Describe each remote annunciator, such as:

1. Waypoint (WPT)

2. Message (MSG)

3. Dead Reckoning (DR)

4. Crosstrack (X-Track) (Parallel-offset)

5. Equipment Status (signal strength, signal status, signal-to-noise ratio, system failure, etc.)

C. SYSTEM SWITCHES

Describe the function and operation of the various switches used with the system.

D. PILOT'S DISPLAY

Describe the pilot's display (i.e., CDI, HSI, RMI, OBS).

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LORAN-C NAVIGATION SYSTEM

E. COPILOT'S DISPLAY

Describe the copilot's display (i.e., CDI, HSI, RMI, OBS).

F. AUTOPILOT OPERATION

Describe the coupling of Loran-C steering information to the autopilot.

G. FLIGHT DIRECTOR

Describe the coupling of Loran-C steering information to the flight director.

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LORAN-C NAVIGATION SYSTEM

SECTION V

ABNORMAL PROCEDURES

No change.

SECTION VI

PERFORMANCE

No Change

FAA APPROVED
DATE: _____

APPENDIX 3. SAMPLE DATA SHEET TO ATTACH TO FAA FORM 337.

ATTACH TO FAA FORM 337
AIRPLANE MAKE:

AIRPLANE MODEL:

AIRPLANE SERIAL NUMBER:

AIRPLANE REGISTRATION NUMBER:

DATE WORK COMPLETED:

_____ Loran-C Navigation System, consisting of the following components, was installed per _____ Installation Manual Number _____, Revision ____, dated _____. The installation conforms to AC 43.13-1A and AC 43.13-2A.

Equipment	Part Number	Serial Number	Software Version
_____ Nav Computer	xxx-xx-xxxx	yyyy-zz	ww
_____ Antenna	xxx-xx-xxxx	yyyy-zz	-
_____ Control/Display	xxx-xx-xxxx	yyyy-zz	ww
etc.			

Proper ground operation of the _____ system was confirmed through completion of the system checkout, Section ___, of the Installation Manual. The system was found to meet or exceed all specifications of this section.

A flight check was made to insure that the accuracy requirements of AC 20-121A were met during flight. ( ) YES ( ) NOT APPLICABLE

PLACE LORAN-C ACCURACY DATA IN AIRCRAFT PERMANENT RECORDS (If applicable)

WAYPOINT:

Latitude/Longitude: _____
or
Station Identifier/Frequency: _____

Radial: _____

Distance: _____

Altitude: _____

Perpendicular distance to tangent point: _____

Distance along track from tangent point: _____

MEASURED SYSTEM ERROR:

Along-Track Error _____

Crosstrack Error: _____

ALLOWABLE SYSTEM ERROR FROM AC 20-121A, PARAGRAPH 9:

Along-Track Error _____

Crosstrack Error _____

LORAN-C CHAIN COVERAGE DIAGRAM

Figure 1

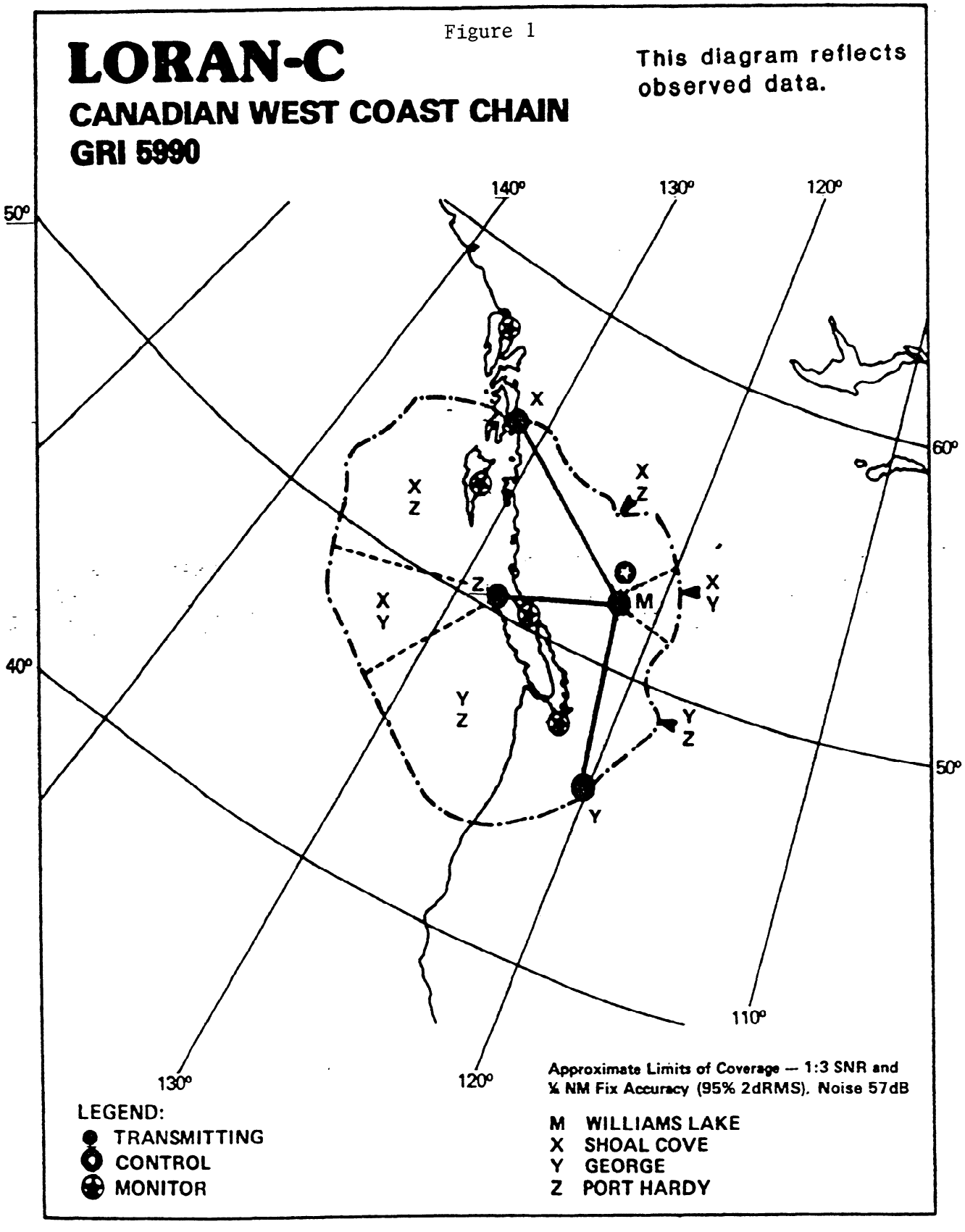

LORAN-C
CANADIAN WEST COAST CHAIN
GRI 5990
This diagram reflects observed data.
140°
130°
120°
50°
60°
40°
110°
X
X Z
Z
X Y
M
Y Z
Y
Approximate Limits of Coverage — 1:3 SNR and ¼ NM Fix Accuracy (95% 2dRMS). Noise 57dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M WILLIAMS LAKE
X SHOAL COVE
Y GEORGE
Z PORT HARDY

Figure 2

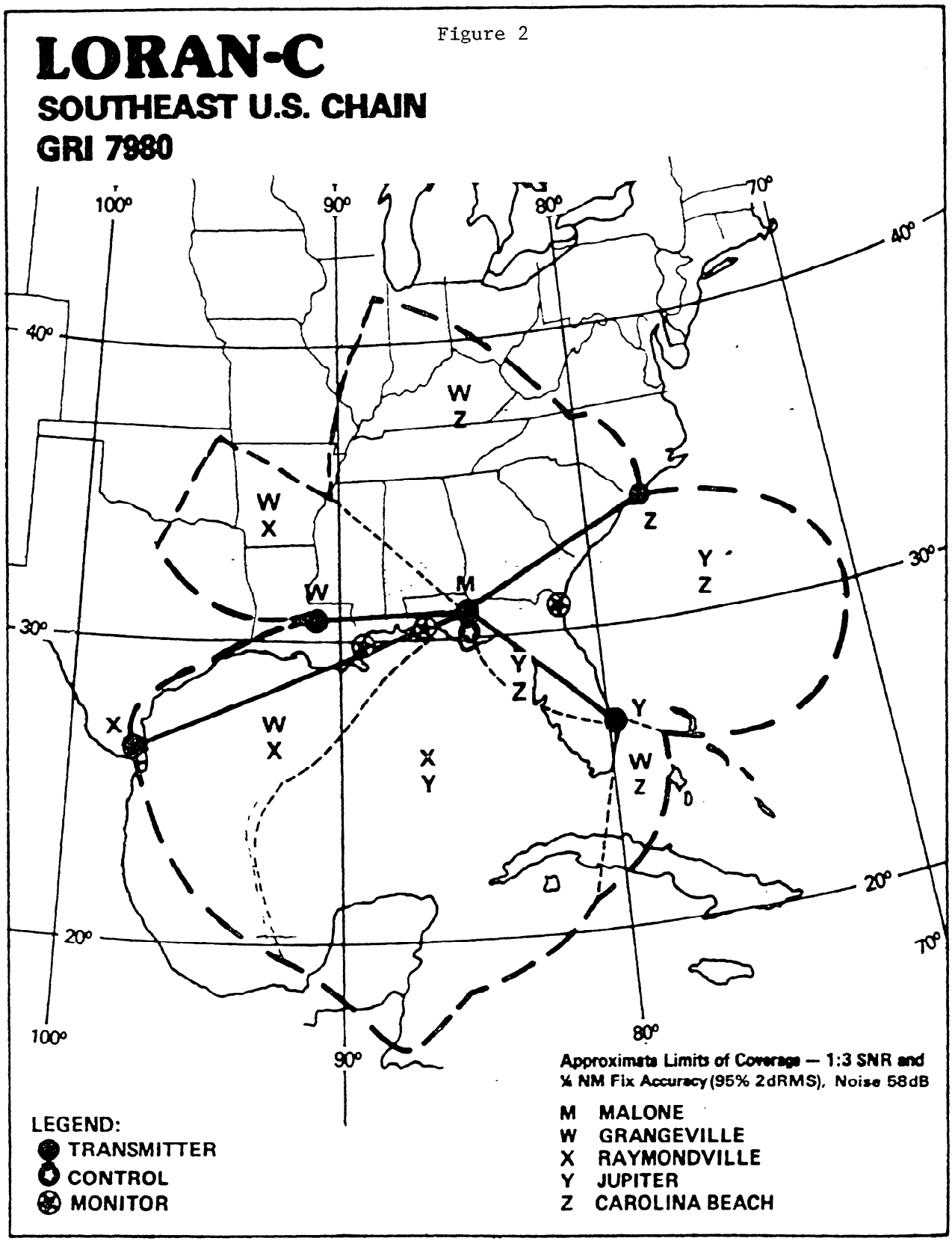

LORAN-C
SOUTHEAST U.S. CHAIN
GRI 7980
100°
90°
80°
70°
40°
30°
20°
W
Z
W
X
Z
Y
Z
W
M
Y
Z
X
W
X
Y
W
Z
D
Approximate Limits of Coverage — 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 58dB
LEGEND:
TRANSMITTER
CONTROL
MONITOR
M MALONE
W GRANGEVILLE
X RAYMONDVILLE
Y JUPITER
Z CAROLINA BEACH

Figure 3

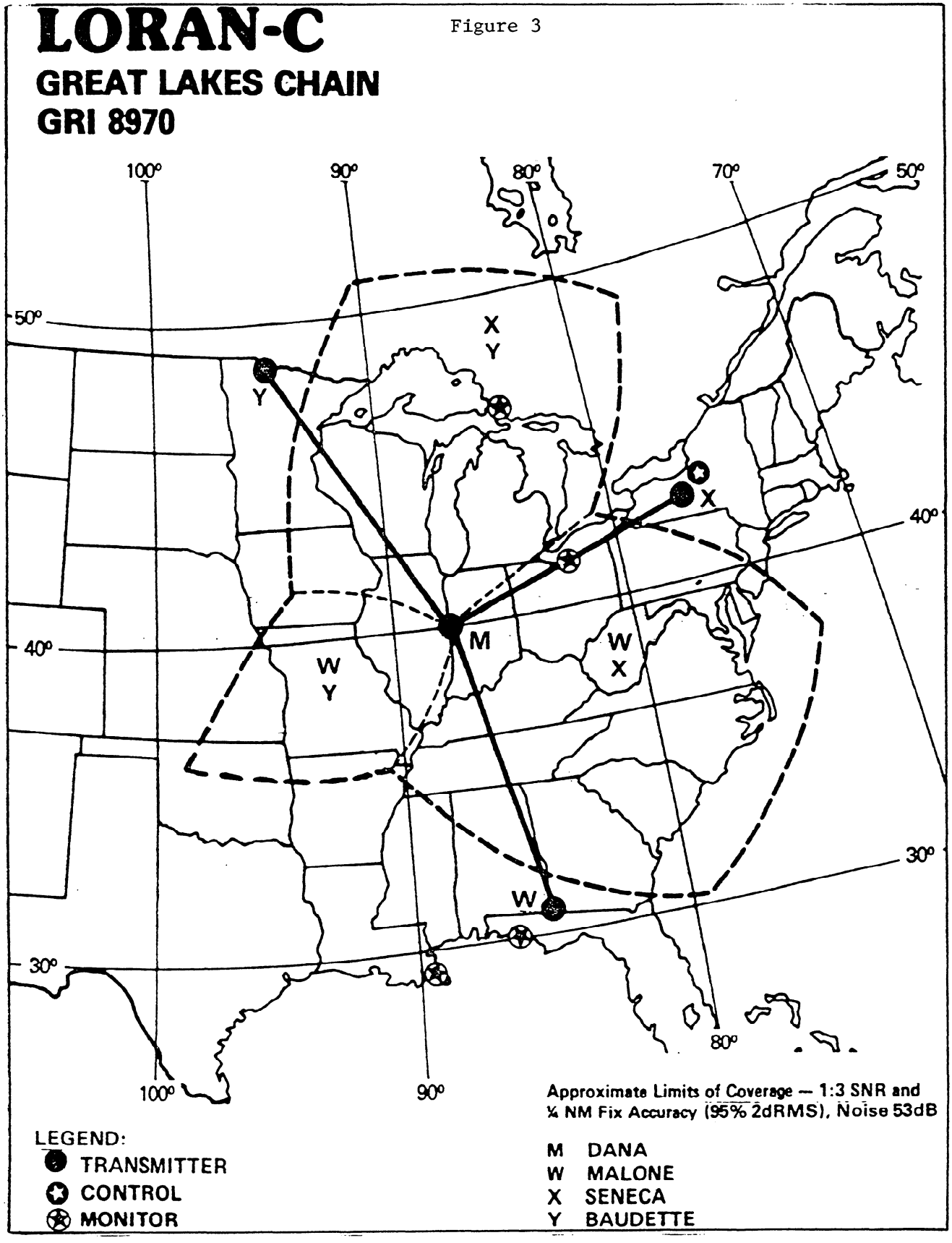

LORAN-C
GREAT LAKES CHAIN
GRI 8970
100°
90°
80°
70°
50°
40°
30°
Y
X
Y
X
M
W
X
W
Y
W
Approximate Limits of Coverage — 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 53dB
LEGEND:
TRANSMITTER
CONTROL
MONITOR
M DANA
W MALONE
X SENECA
Y BAUDETTE

Figure 4

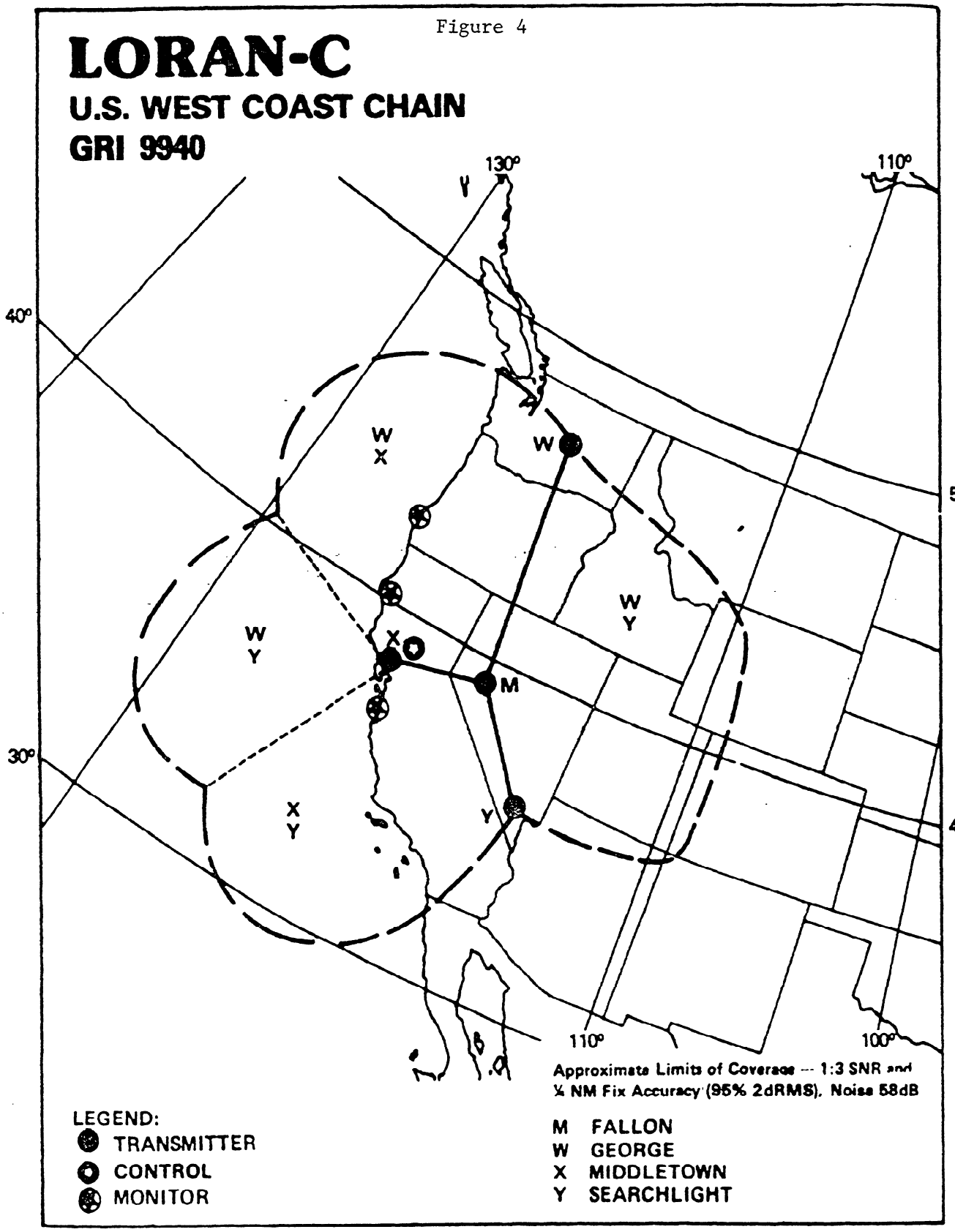
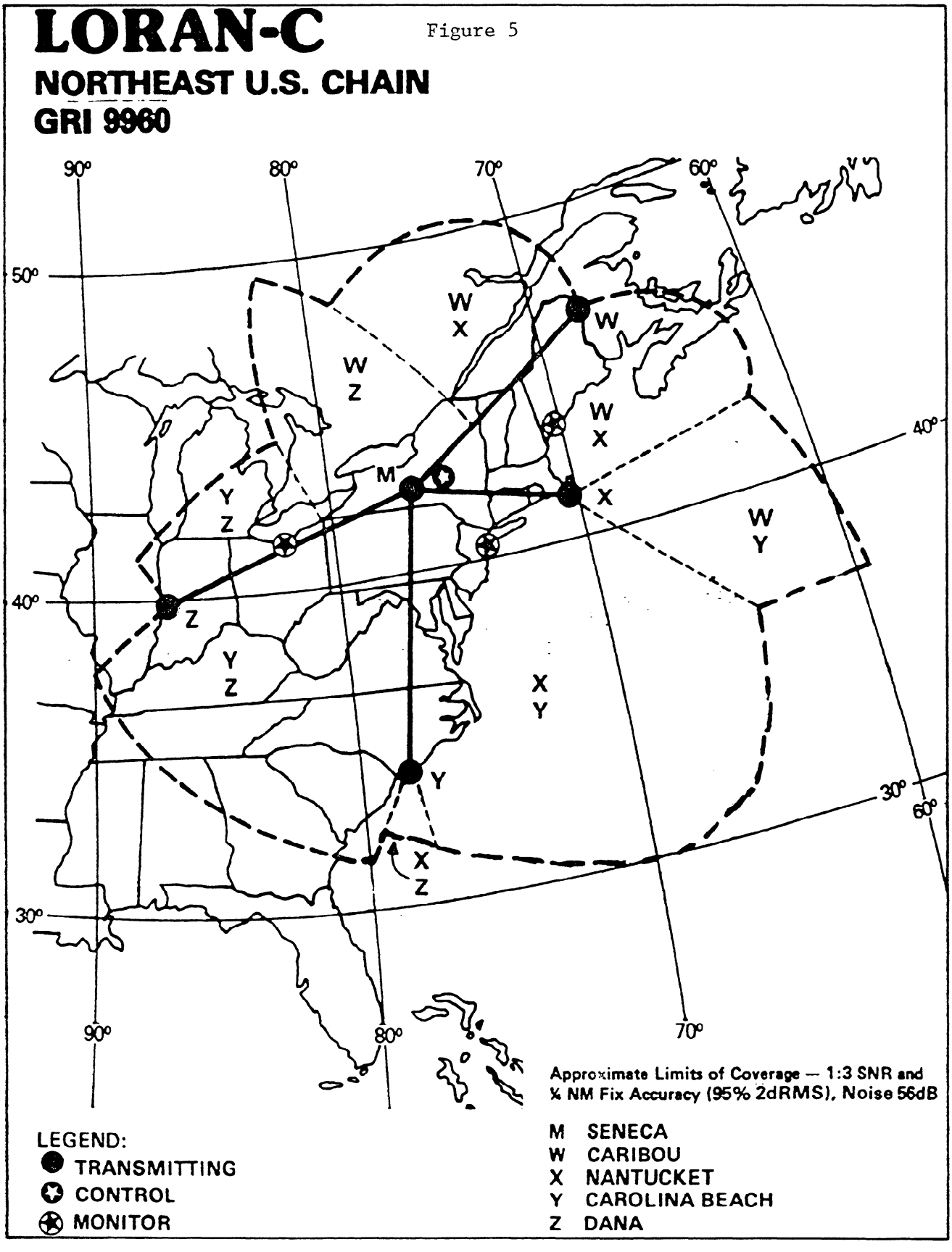

LORAN-C
U.S. WEST COAST CHAIN
GRI 9940
130°
110°
40°
50°
30°
40°
110°
100°
W
X
W
W
Y
X
M
W
Y
X
Y
Y
Approximate Limits of Coverage -- 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 58dB
LEGEND:
TRANSMITTER
CONTROL
MONITOR
M FALLON
W GEORGE
X MIDDLETOWN
Y SEARCHLIGHT

Figure 5


LORAN-C
NORTHEAST U.S. CHAIN
GRI 9960
90°
80°
70°
60°
50°
40°
30°
W
X
W
W
Z
W
X
M
X
Y
Z
W
Y
Z
Y
Z
X
Y
Y
X
Z
Approximate Limits of Coverage — 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 56dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M SENECA
W CARIBOU
X NANTUCKET
Y CAROLINA BEACH
Z DANA

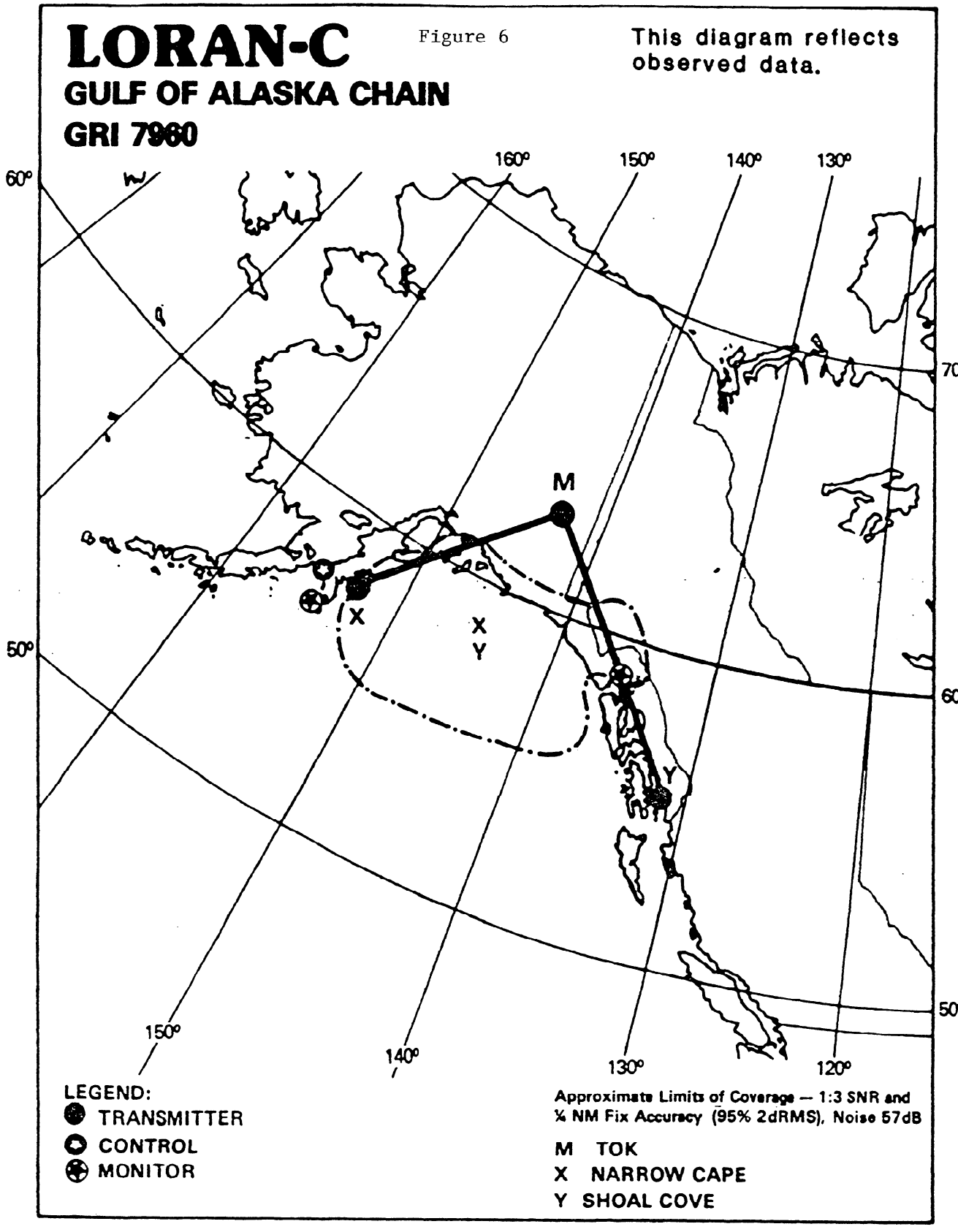

LORAN-C
Figure 6
This diagram reflects observed data.
GULF OF ALASKA CHAIN
GRI 7960
60°
160°
150°
140°
130°
70°
50°
60°
50°
150°
140°
130°
120°
M
X
X
Y
Y
LEGEND:
TRANSMITTER
CONTROL
MONITOR
Approximate Limits of Coverage — 1:3 SNR and ¼ NM Fix Accuracy (95% 2dRMS), Noise 57dB
M TOK
X NARROW CAPE
Y SHOAL COVE

Figure 7

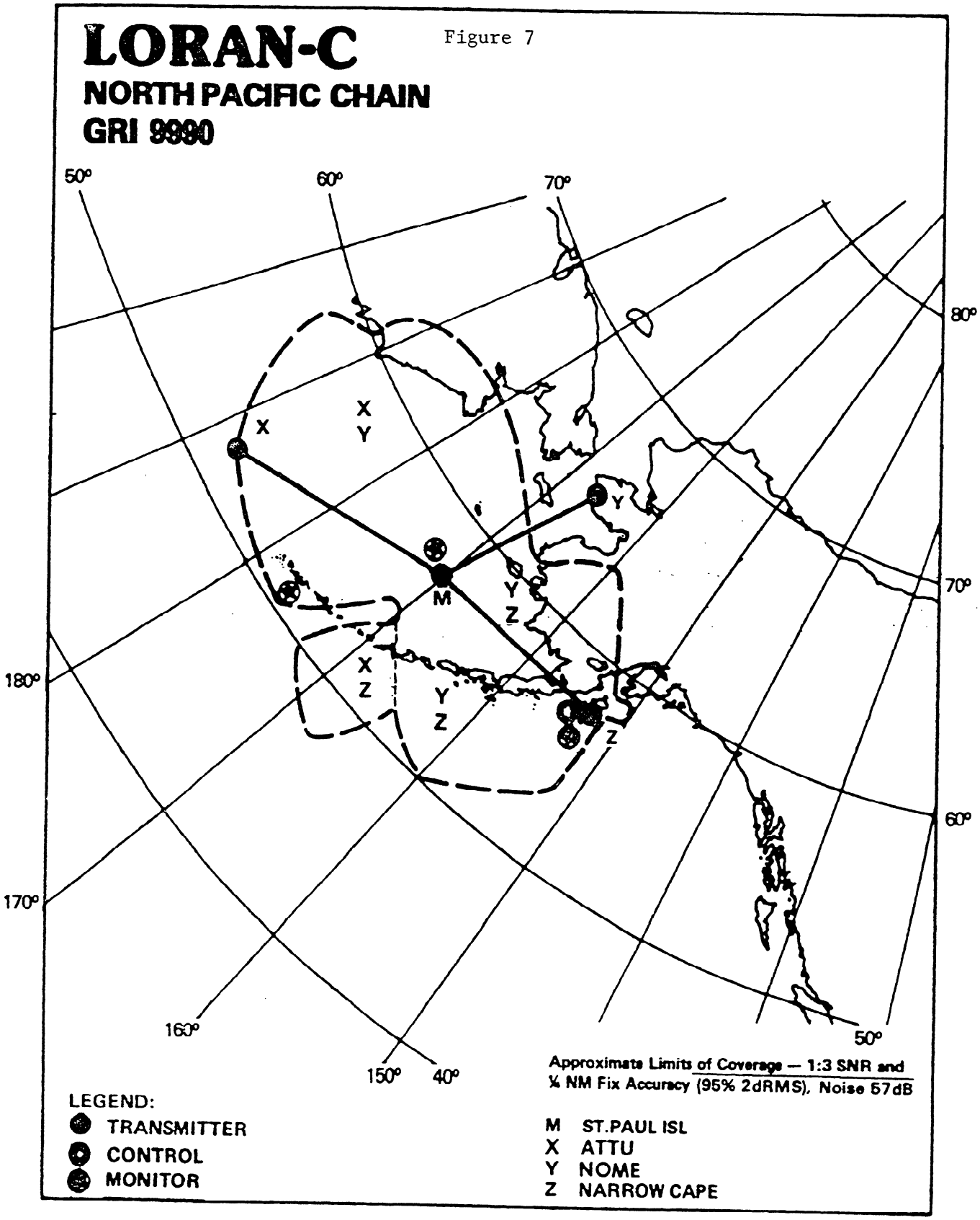

LORAN-C
NORTH PACIFIC CHAIN
GRI 9990
50°
60°
70°
80°
70°
60°
50°
40°
150°
160°
170°
180°
X
X
Y
Y
M
Y
Z
X
Z
Y
Z
Z
Approximate Limits of Coverage — 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 57dB
LEGEND:
TRANSMITTER
CONTROL
MONITOR
M ST.PAUL ISL
X ATTU
Y NOME
Z NARROW CAPE

Figure 8

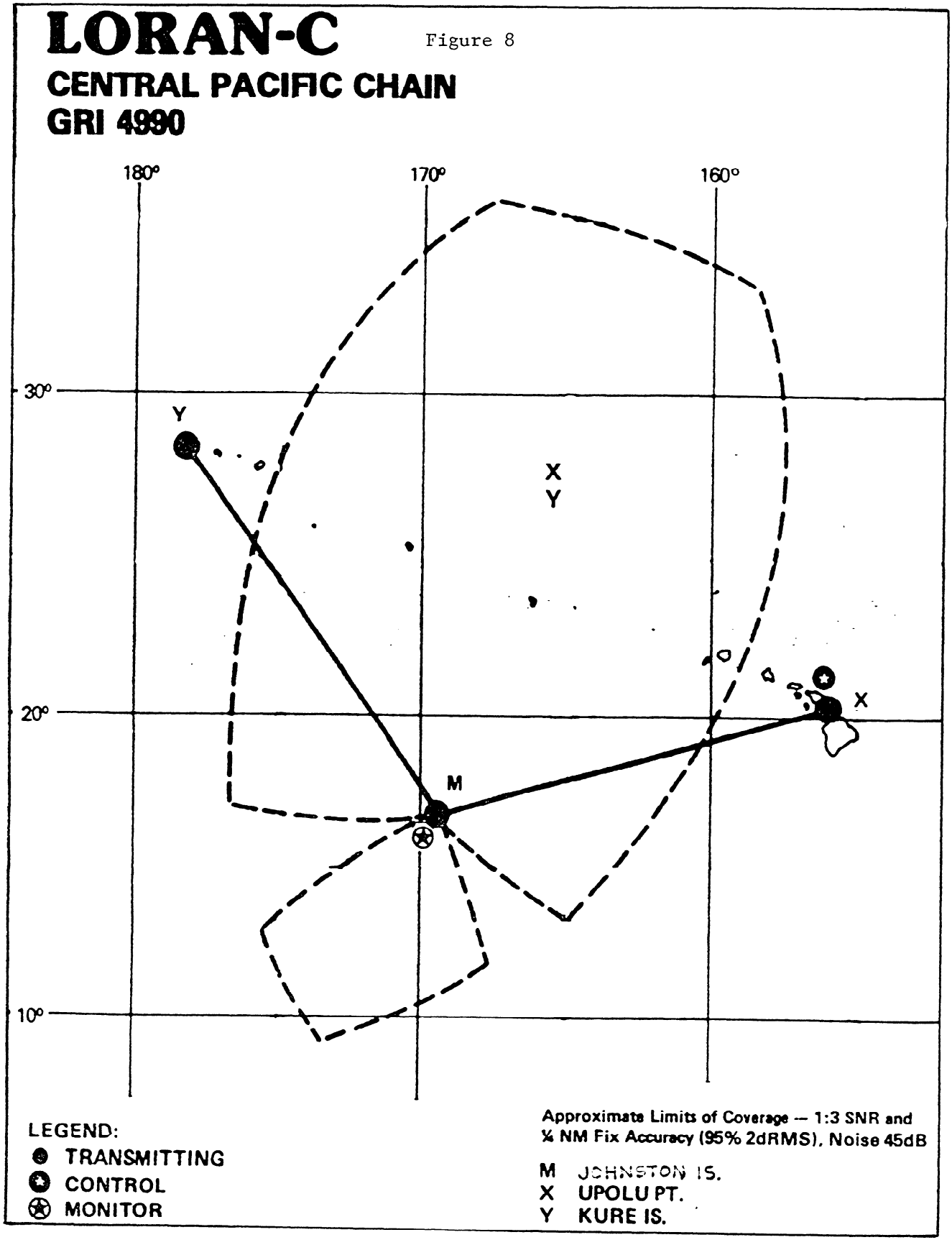

LORAN-C
CENTRAL PACIFIC CHAIN
GRI 4990
180°
170°
160°
30°
20°
10°
Y
X
Y
X
M
LEGEND:
TRANSMITTING
CONTROL
MONITOR
Approximate Limits of Coverage — 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 45dB
M JOHNSTON IS.
X UPOLU PT.
Y KURE IS.

Figure 9

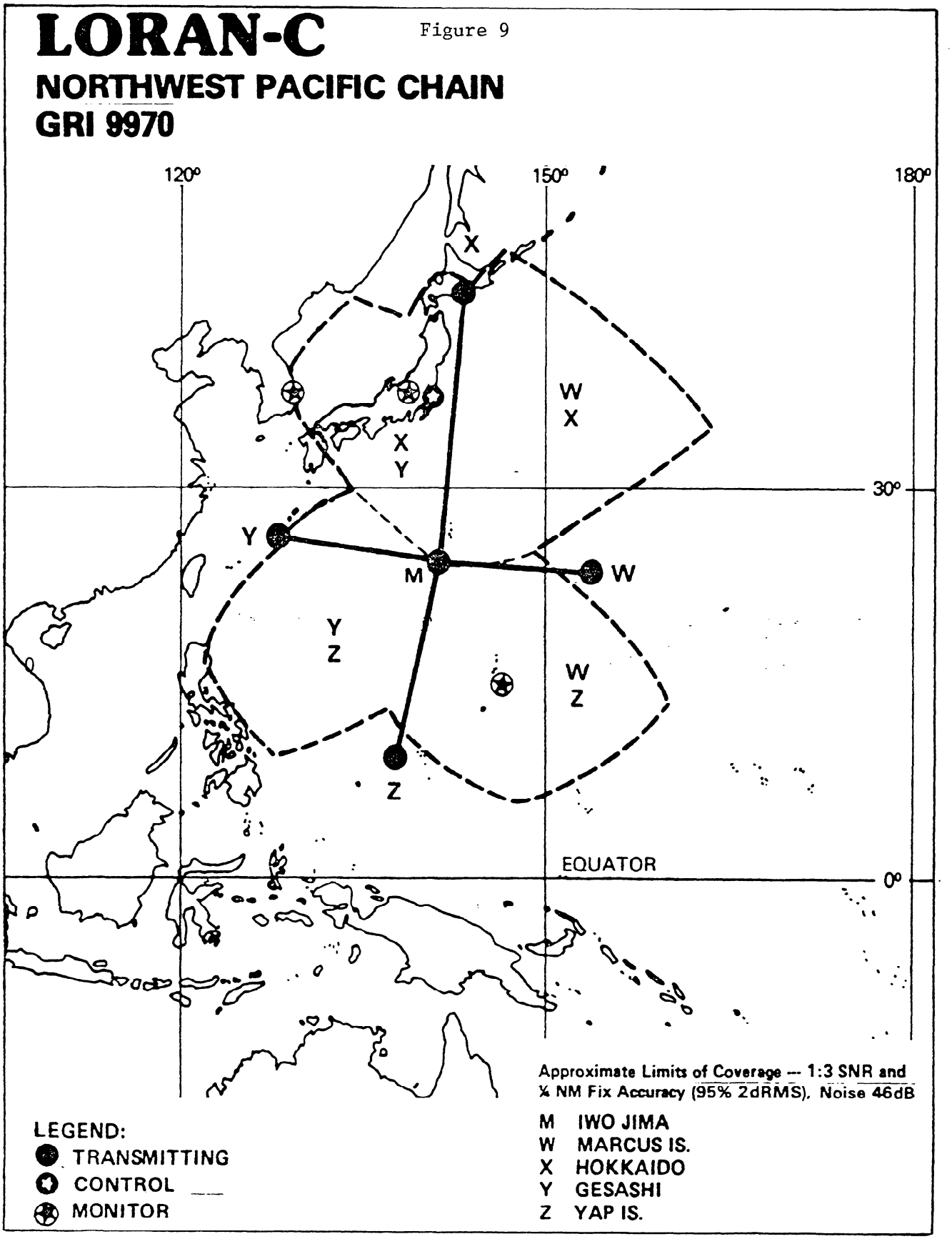

LORAN-C
NORTHWEST PACIFIC CHAIN
GRI 9970
120°
150°
180°
30°
0°
EQUATOR
X
W
X
X
Y
Y
M
W
Y
Z
W
Z
Z
Approximate Limits of Coverage — 1:3 SNR and ¼ NM Fix Accuracy (95% 2dRMS), Noise 46dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M IWO JIMA
W MARCUS IS.
X HOKKAIDO
Y GESASHI
Z YAP IS.

Figure 10

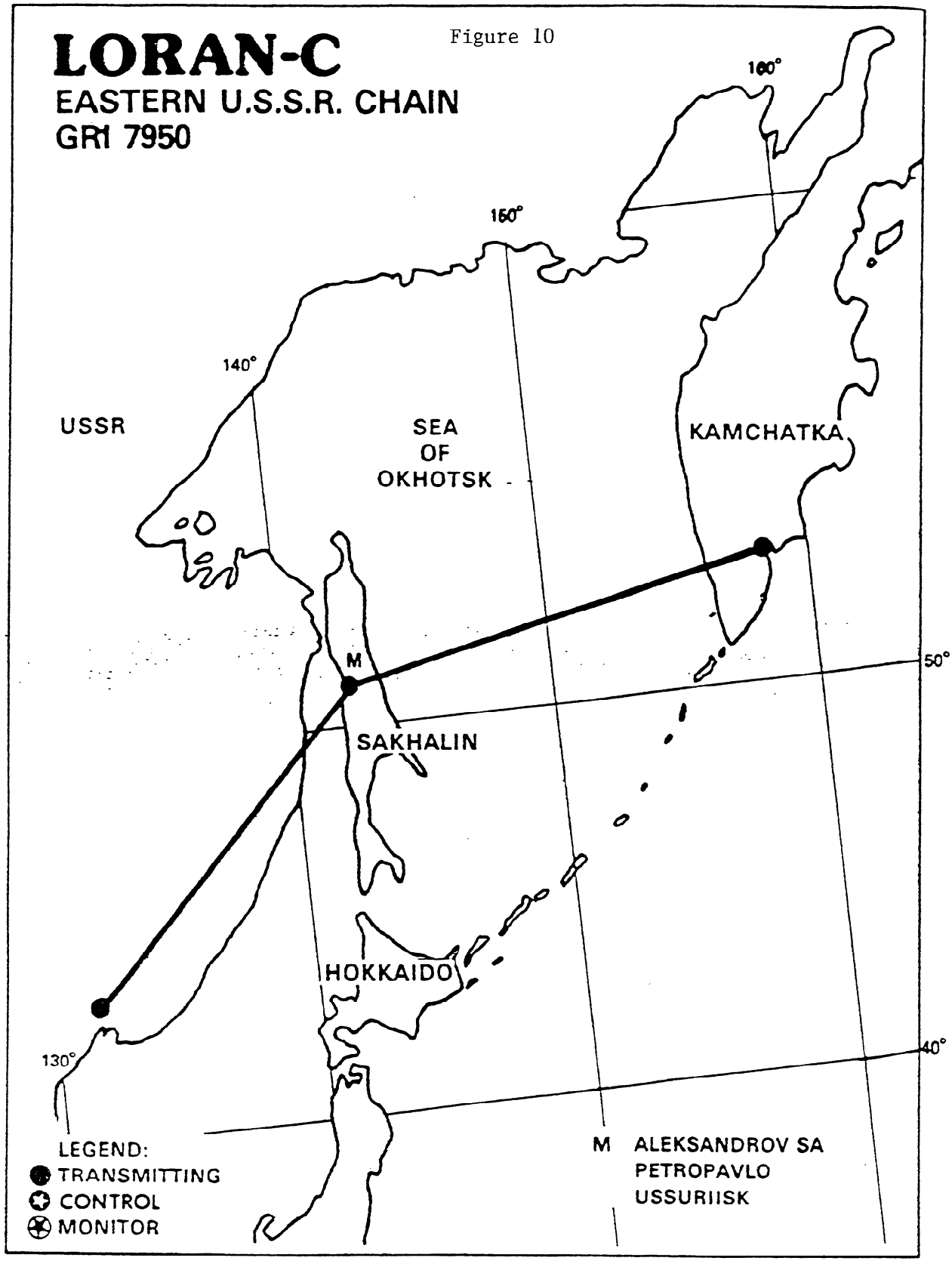

LORAN-C
EASTERN U.S.S.R. CHAIN
GRI 7950
180°
160°
140°
130°
50°
40°
USSR
SEA
OF
OKHOTSK
KAMCHATKA
M
SAKHALIN
HOKKAIDO
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M ALEKSANDROV SA
PETROPAVLO
USSURIISK

Figure 10

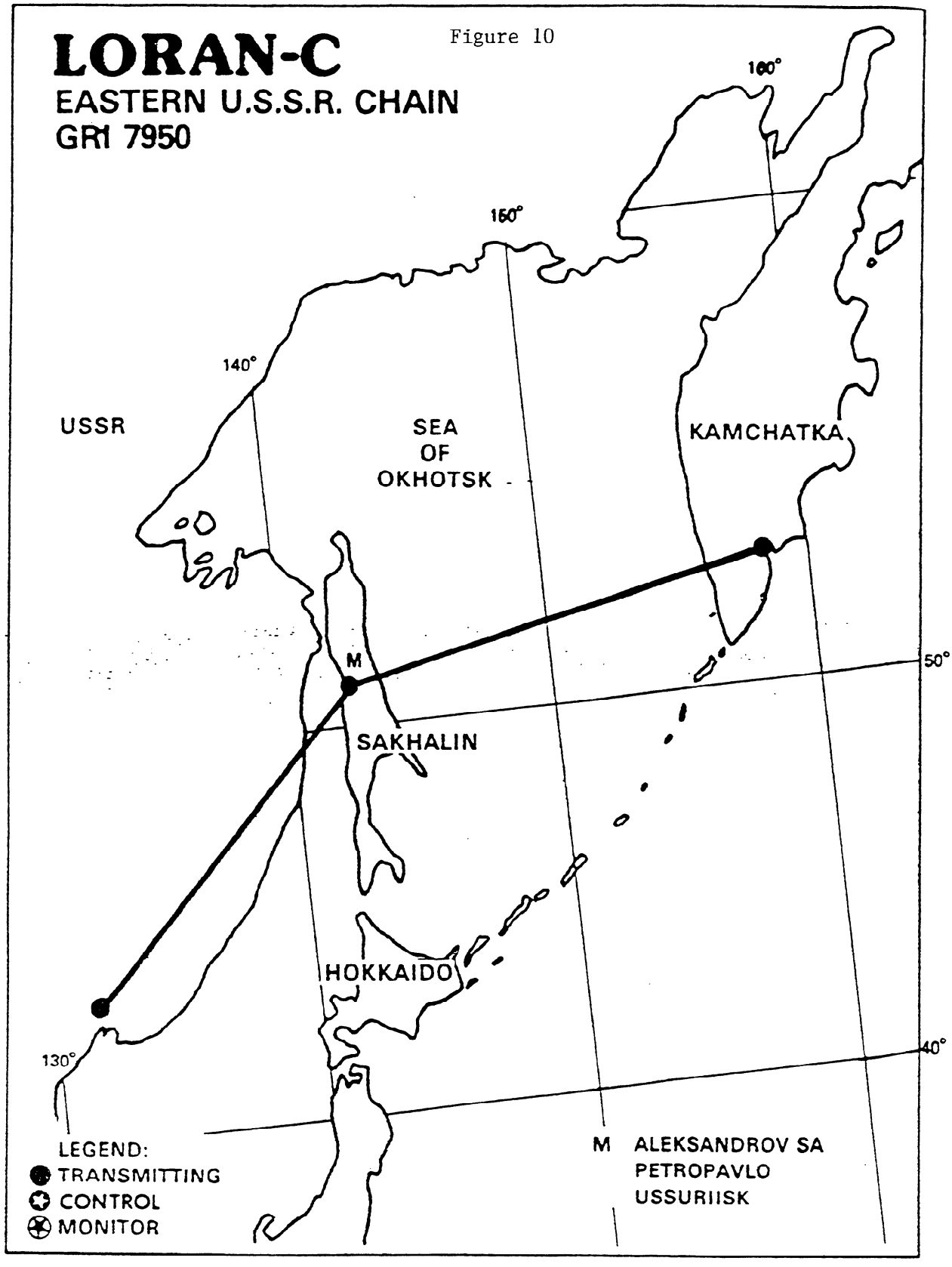

LORAN-C
EASTERN U.S.S.R. CHAIN
GRI 7950
180°
160°
140°
130°
50°
40°
USSR
SEA
OF
OKHOTSK
KAMCHATKA
M
SAKHALIN
HOKKAIDO
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M ALEKSANDROV SA
PETROPAVLO
USSURIISK

Figure 12

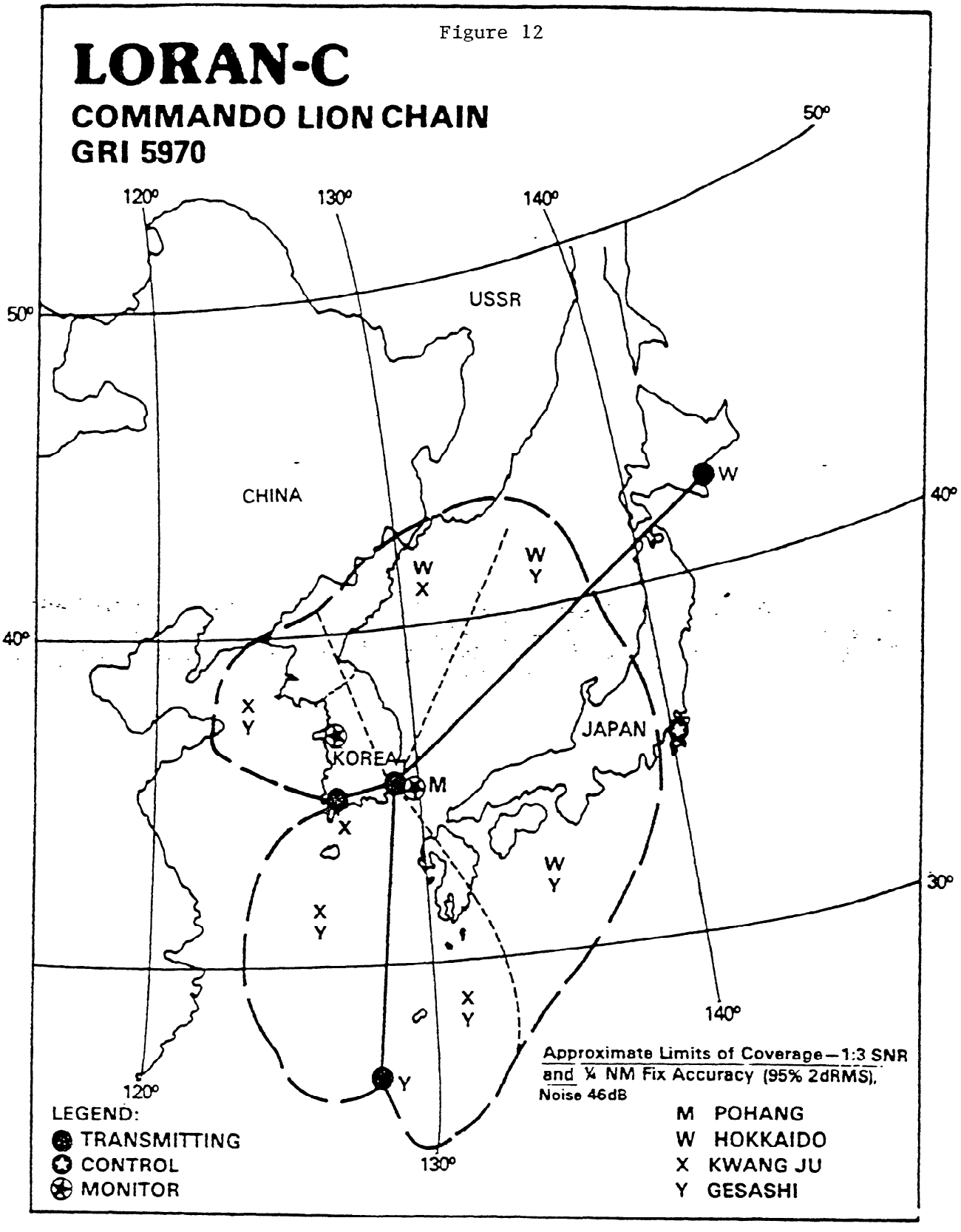

LORAN-C
COMMANDO LION CHAIN
GRI 5970
120°
130°
140°
50°
40°
30°
USSR
CHINA
JAPAN
KOREA
W
M
X
Y
W X
W Y
X Y
Approximate Limits of Coverage—1:3 SNR and ¼ NM Fix Accuracy (95% 2dRMS), Noise 46dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M POHANG
W HOKKAIDO
X KWANG JU
Y GESASHI

Figure 13

LORAN-C

CANADIAN EAST COAST CHAIN
GRI 5930

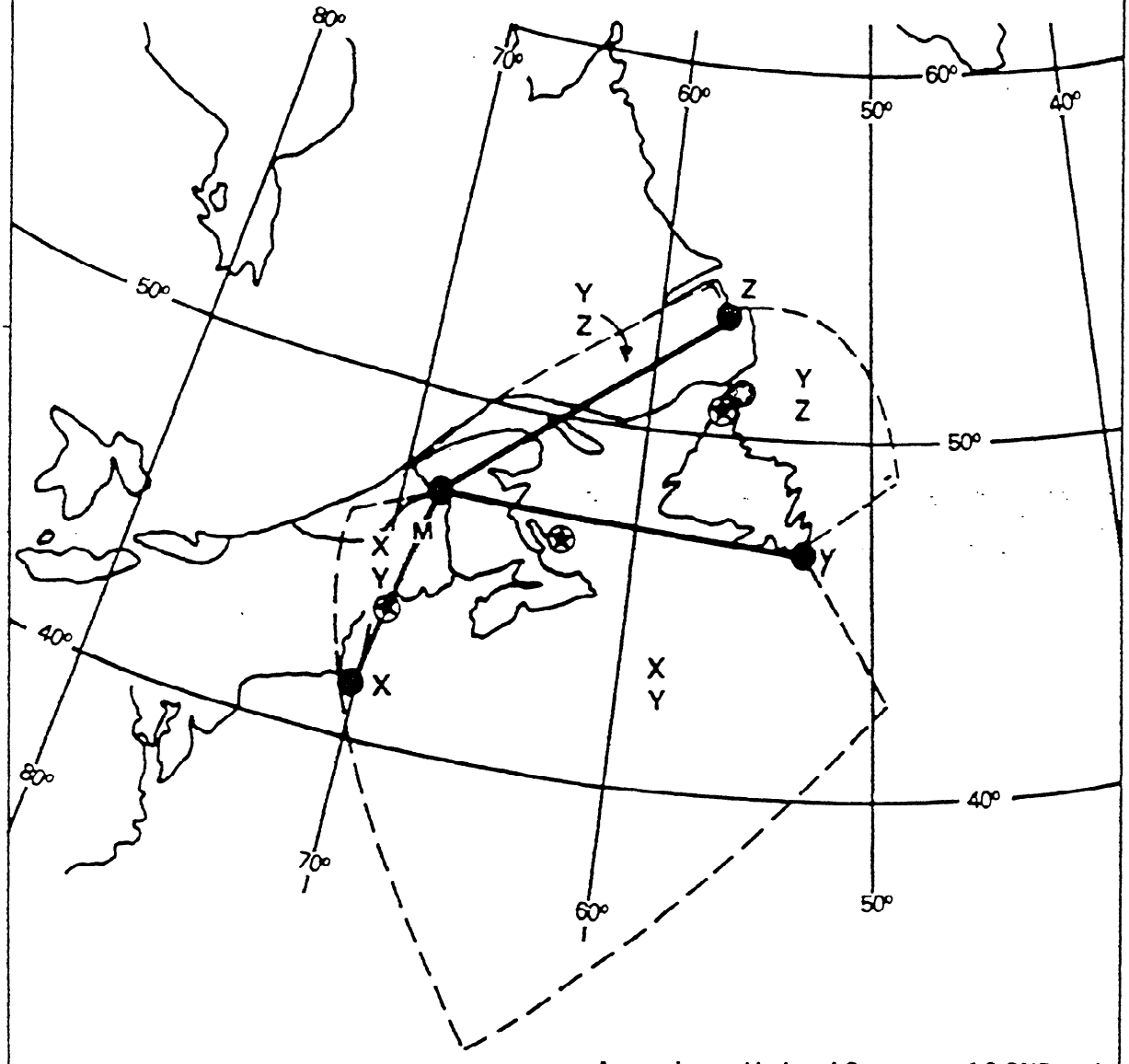


Figure 14

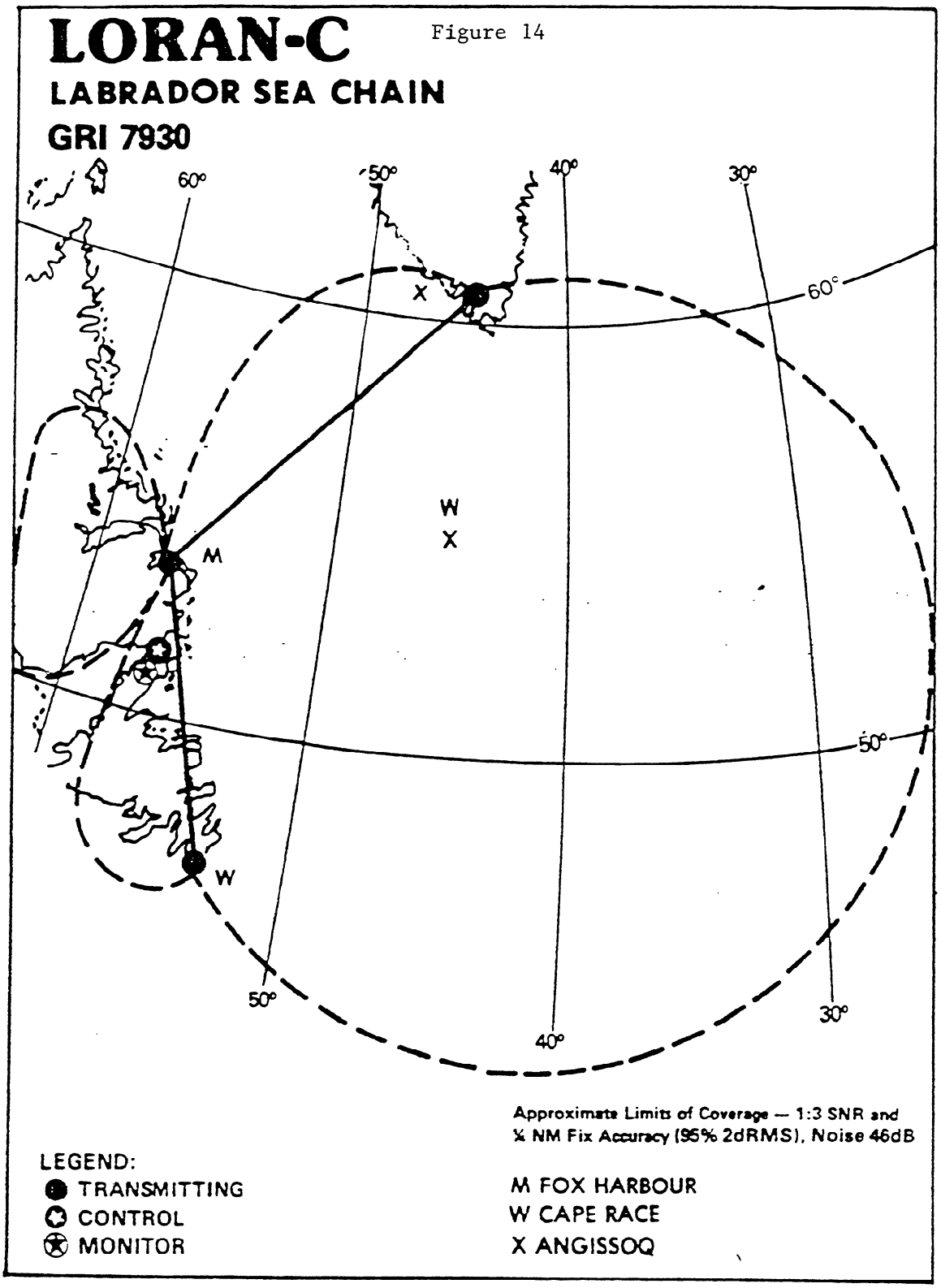

LORAN-C
LABRADOR SEA CHAIN
GRI 7930
60°
50°
40°
30°
60°
50°
40°
30°
X
W
X
M
W
Approximate Limits of Coverage — 1:3 SNR and
¼ NM Fix Accuracy (95% 2dRMS), Noise 46dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M FOX HARBOUR
W CAPE RACE
X ANGISSOQ

Figure 15

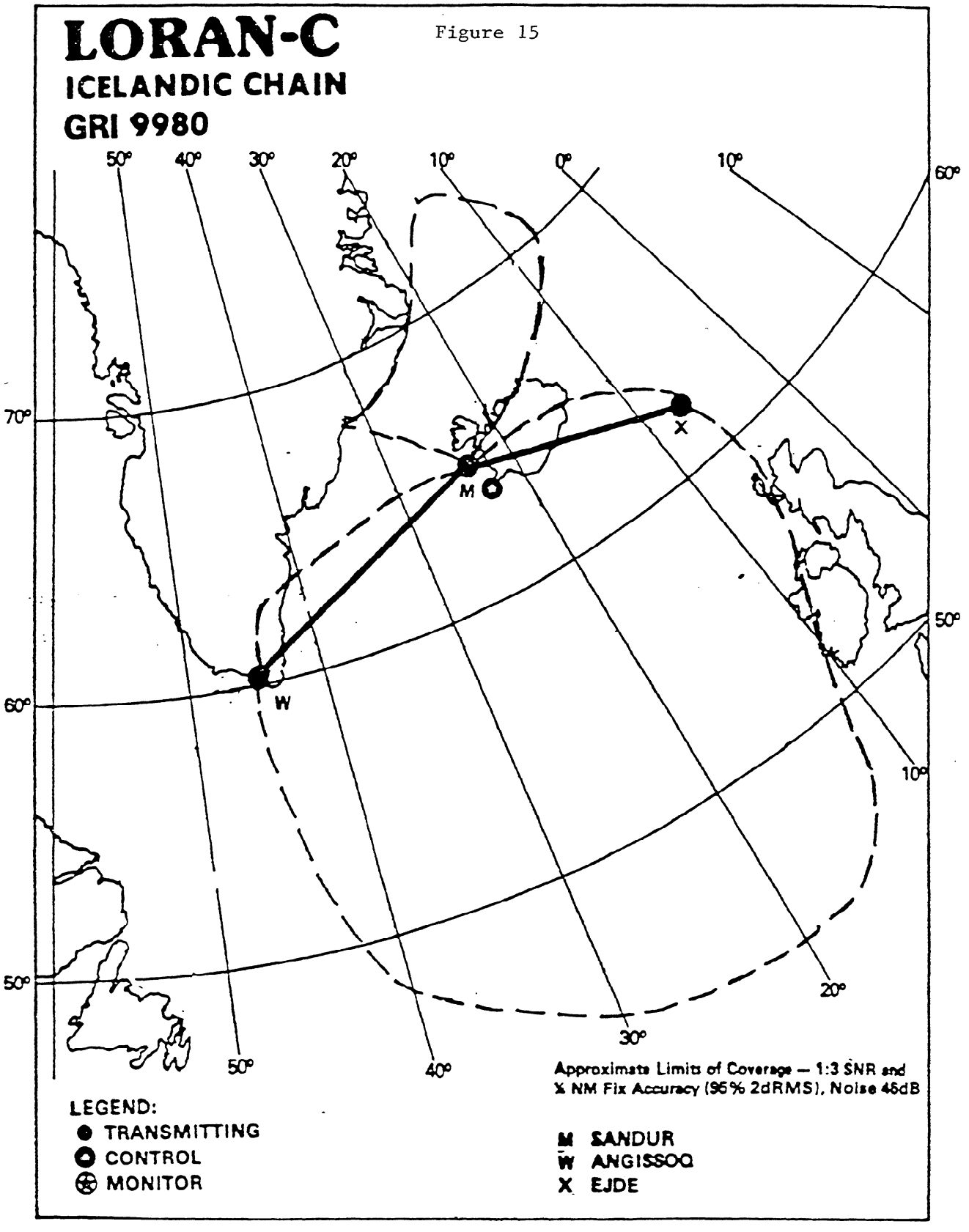

LORAN-C
ICELANDIC CHAIN
GRI 9980
50°
40°
30°
20°
10°
0°
10°
60°
70°
60°
50°
50°
40°
30°
20°
10°
M
W
X
Approximate Limits of Coverage — 1:3 SNR and
X NM Fix Accuracy (95% 2dRMS), Noise 45dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M SANDUR
W ANGISSOQ
X EJDE

Figure 16

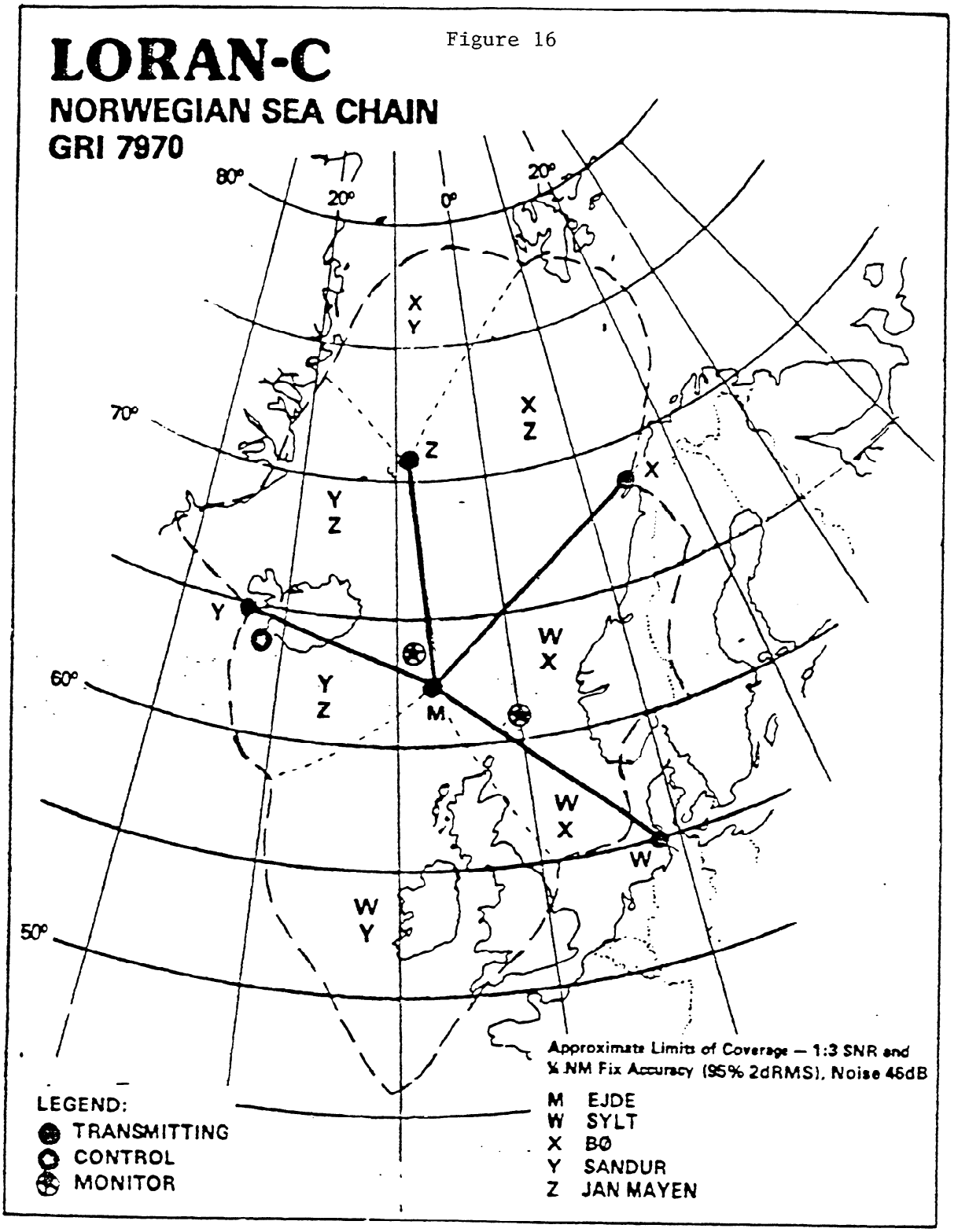

LORAN-C
NORWEGIAN SEA CHAIN
GRI 7970
80°
20°
0°
20°
70°
60°
50°
X
Y
X
Z
Y
Z
Y
Z
W
X
W
X
W
W
Y
Z
X
Y
M
W
Approximate Limits of Coverage — 1:3 SNR and ¼ NM Fix Accuracy (95% 2dRMS), Noise 46dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M EJDE
W SYLT
X BØ
Y SANDUR
Z JAN MAYEN

Figure 17

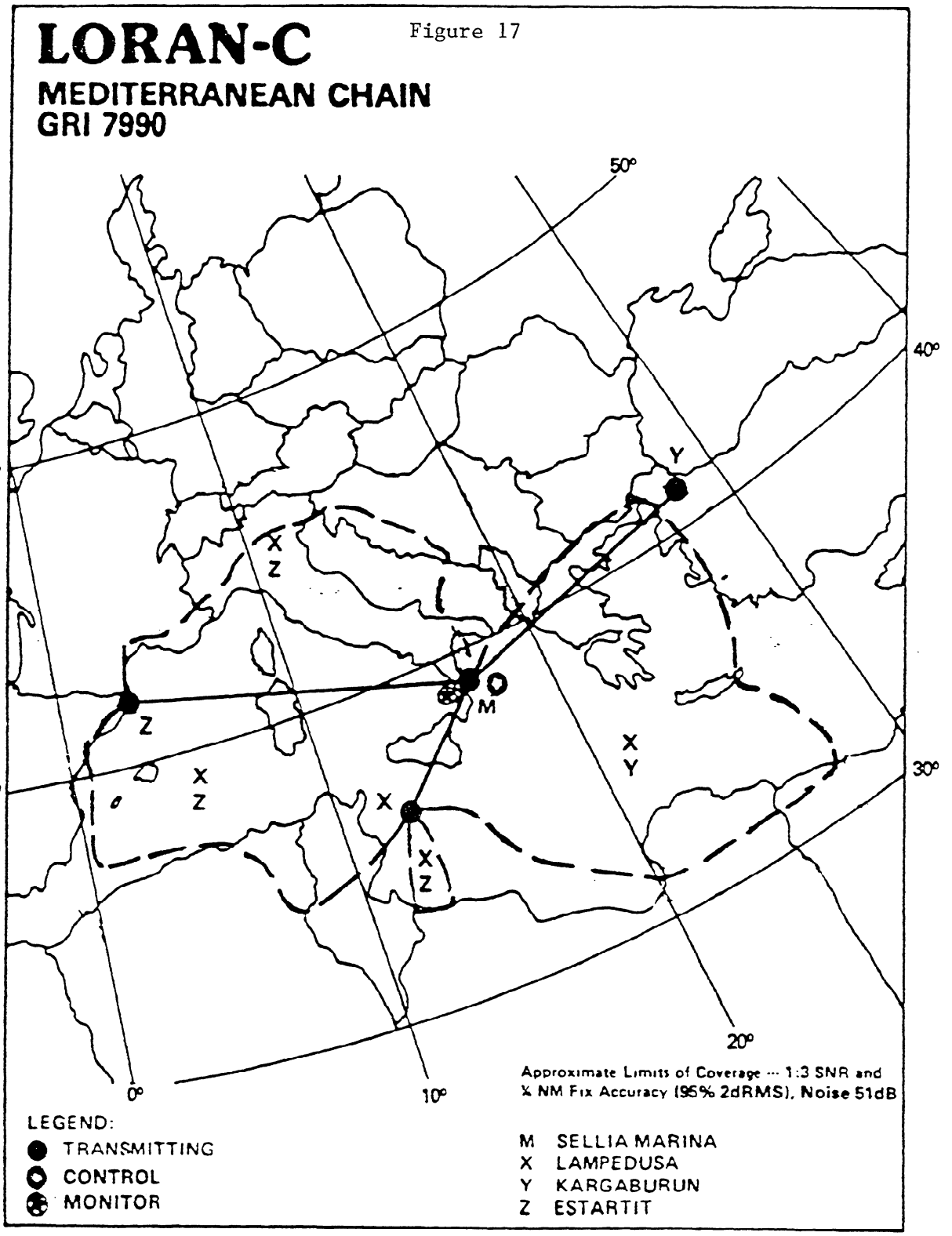
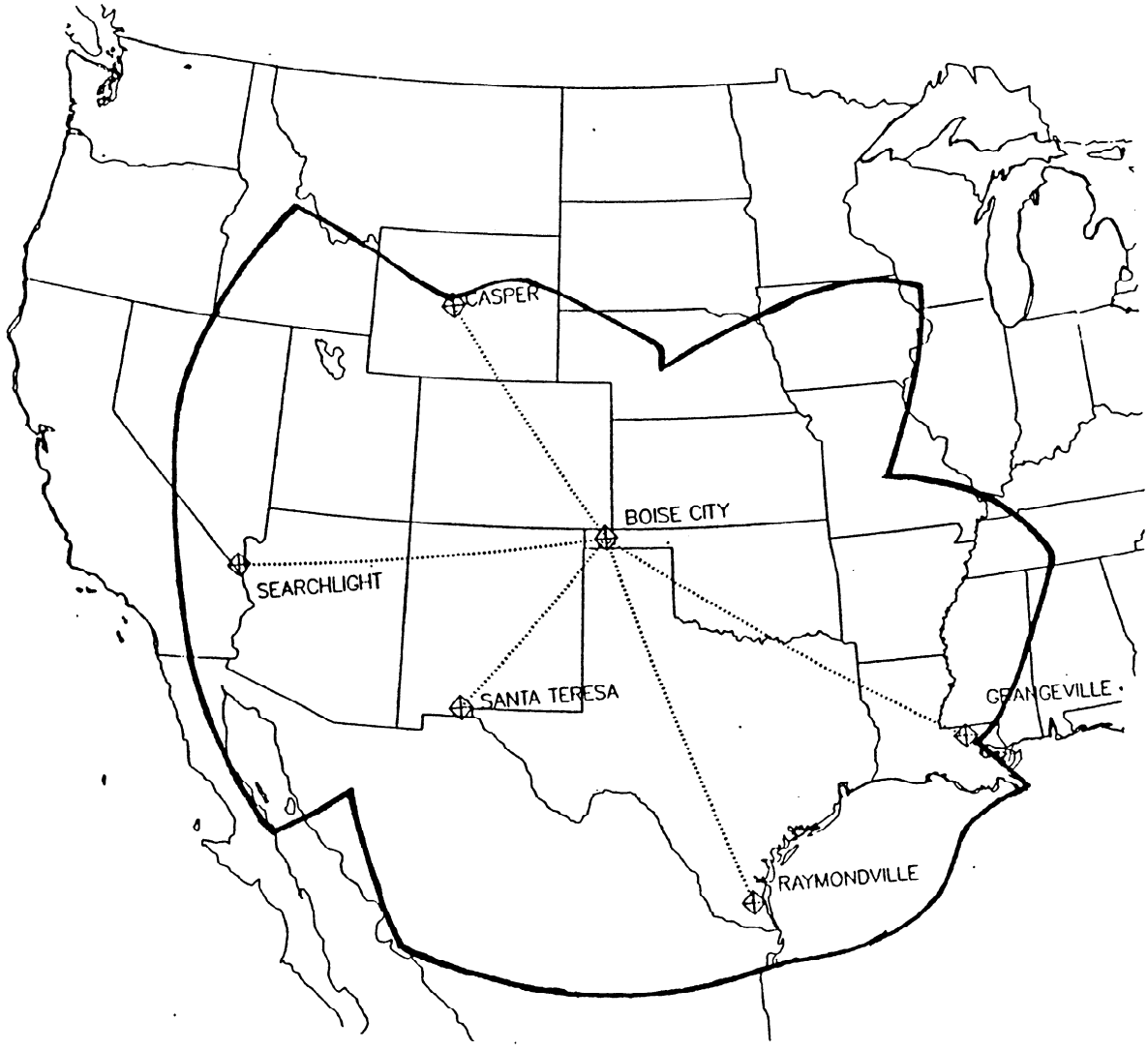

LORAN-C
MEDITERRANEAN CHAIN
GRI 7990
50°
40°
30°
20°
10°
0°
50°
40°
M
X
Y
Z
Approximate Limits of Coverage — 1:3 SNR and ¼ NM Fix Accuracy (95% 2dRMS), Noise 51dB
LEGEND:
TRANSMITTING
CONTROL
MONITOR
M SELLIA MARINA
X LAMPEDUSA
Y KARGABURUN
Z ESTARTIT

Figure 18

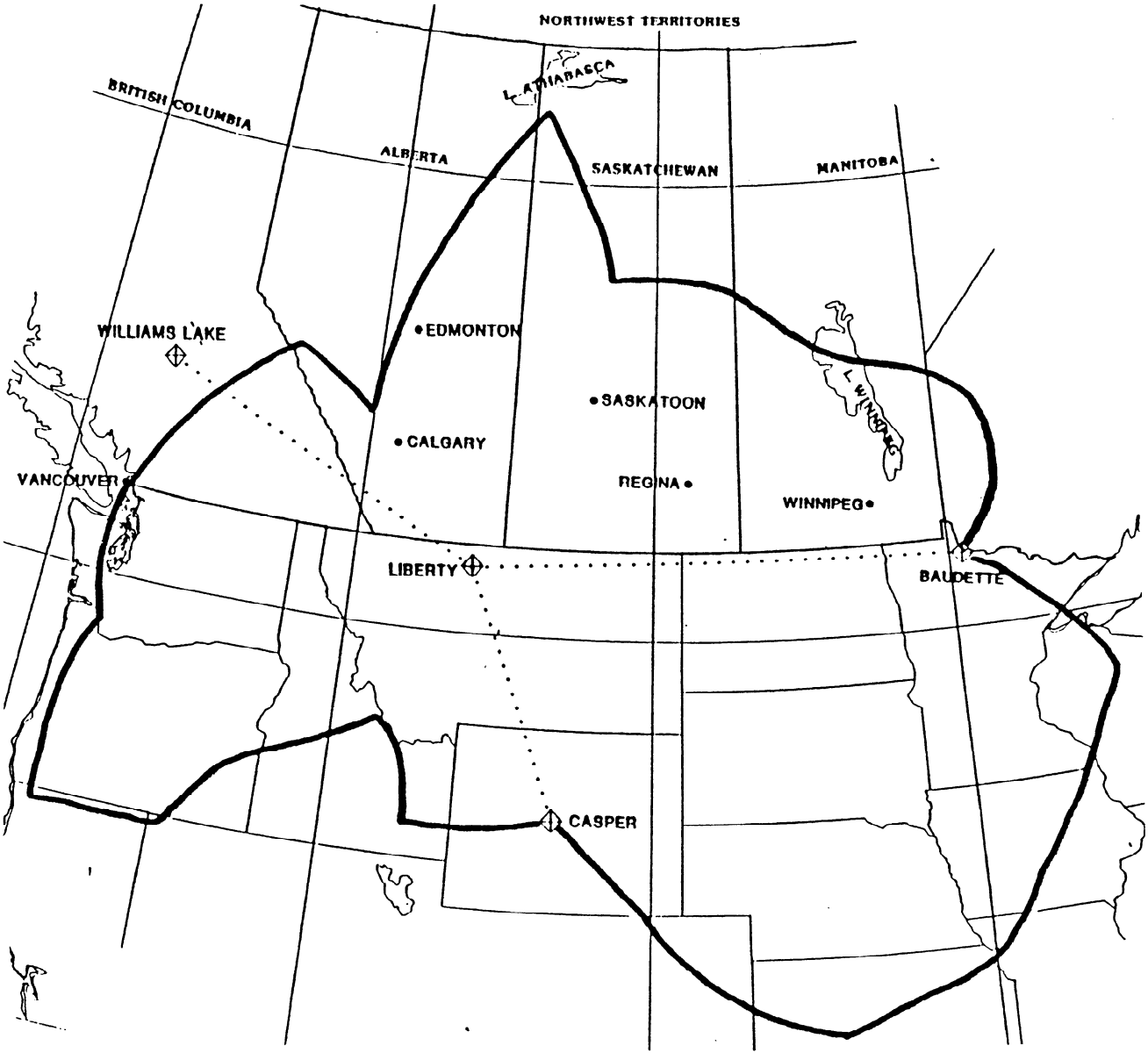
PROPOSED SOUTH CENTRAL U.S. CHAIN



PREDICTED LORAN-C GROUNDWAVE COVERAGE
SOUTH CENTRAL U.S. (SOCUS) CHAIN
0.1 USEC TD STD DEV
0.25 NAUTICAL MILE 2DRMS
SNR -10DB NOISE 57DB ABOVE 1uV/M

Figure 19

PROPOSED NORTH CENTRAL U.S. CHAIN



PREDICTED LORAN-C GROUNDWAVE COVERAGE
NORTH CENTRAL U.S. CHAIN (NOCUS)
0.1 USEC TD STD DEV
0.25 NAUTICAL MILE 2DRMS
SNR -100B NOISE 53DB ABOVE 1pV/M